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April 6, 2000

Assistant Commissioner for Patents  
Washington, D.C. 20231

Attention: Box PCT - DESIGNATED/ELECTED OFFICE (DO/EO/US)

FORM PTO-1390 (REV 5-93)		U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 31443-159708 RK	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U S. APPLICATION NO. (If known, see 37 CFR 1.5)	
				09/529004	
INTERNATIONAL APPLICATION NO. PCT/HU98/00034		INTERNATIONAL FILING DATE March 31, 1998		PRIORITY DATES CLAIMED: October 6, 1997	
TITLE OF INVENTION - see attached pages -					
APPLICANT(S) FOR DO/EO/US - see attached pages -					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(l).					

- See attached pages for additional data -

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April 6, 2000

09/529004  
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Attorney Docket: 31443-159708 RK

Attention: PCT-DO/US

Re: International Application PCT/HU98/00034 filed March 31, 1998  
Priority Claimed: Hungarian Patent Application U 97 00256 filed October 6, 1997

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Title: **CLOSED-LOOP CONTINUOUS OPERATING PYROLYSIS SYSTEM  
FOR PROCESSING RUBBER WASTE**

Sir:

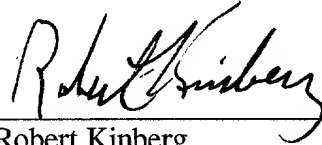
Submitted herewith, as the first submission, are the following for the purposes of entering the national stage for the USA under 35 U.S.C. 371(c), **immediate national examination under 35 U.S.C. 371(f) being requested.**

- English-language International Application No. PCT/HU98/00034 published as WO 99/18171 with English-language international search report issued by the European Patent Office.
- Preliminary Amendment to eliminate multiple claim dependency.
- Filing fee of \$840.00.

**Page 2**

Should no remittance be attached, or should a greater or lesser fee be required, please charge or credit our Account No. 22-0261.

Respectfully submitted,



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re PATENT APPLICATION of

Applicants	:	Peter BARSİ et al.	)	
			)	
Int'l Appln. No.	:	PCT/HU98/00034	)	
			)	
Int'l Filing Date	:	March 31, 1998	)	
			)	
For	:	CLOSED-LOOP CONTINUOUS	)	<b>PRELIMINARY AMENDMENT</b>
		OPERATING PYROLYSIS SYSTEM	)	
		FOR PROCESSING RUBBER WASTE	)	
			)	
Attorney Docket	:	31443-159708 RK		<hr/> <b>April 6, 2000</b>

Assistant Commissioner for Patents  
Washington, D.C. 20231

**Attention: PCT DO/EO/US**

Sir:

Prior to examination and calculation of the filing fee for this application, please amend the claims of the international application as follows:

Claim 3, line 1, delete "or 2".

Claim 4, lines 1-2, delete "or 3".

Claim 5, lines 1-2, delete "or 4".

Claim 6, lines 1-2, delete "or 5".

Claim 7, lines 1-2, delete "or 6".

[illegible]

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01/029, 004

Applicants: Péter BARSÍ, Tibor FÜLÖP, József SISKÁ, György SUGÁR Attorney's 31443-  
Serial or Patent No.: PCT/HU98/00034 Docket No.: 159708  
Filed: March 31, 1998  
For: CLOSED-LOOP CONTINUOUS OPERATING PYROLYSIS SYSTEM FOR PROCESSING  
RUBBER WASTE

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS  
(37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled CLOSED-LOOP CONTINUOUS OPERATING PYROLYSIS SYSTEM FOR PROCESSING RUBBER WASTE described in

☐ the specification filed herewith

☒ application serial no. PCT/HU98/00034, filed March 31, 1998

☐ patent no. \_\_\_\_\_, issued \_\_\_\_\_

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:

☒ no such person, concern or organization

☐ persons, concerns or organizations listed below\*

\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ INDIVIDUAL

☐ SMALL BUSINESS CONCERN

☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any changes in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Péter BARSÍ

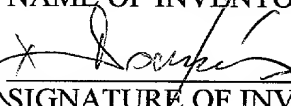
NAME OF INVENTOR

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 SIGNATURE OF INVENTOR

 SIGNATURE OF INVENTOR

 SIGNATURE OF INVENTOR

April 05, 2000

DATE

April 05, 2000

DATE

April 05, 2000

DATE

DC2-DOCS1-105110

2000-360641

DATE \_\_\_\_\_

Country	Year	Population (millions)	GDP (billion USD)	Per capita GDP (USD)	Life expectancy (years)	Infant mortality (per 1,000 live births)	Unemployment (%)	Urban population (%)	Government expenditure (%)	Private expenditure (%)	Health expenditure (%)	Health expenditure per capita (USD)
Algeria	1980	12.5	10.0	800	65	100	10	50	15	10	1	10
Algeria	1985	13.0	15.0	1150	68	80	12	55	18	12	1.5	15
Algeria	1990	13.5	20.0	1480	70	60	15	60	20	15	2.0	20
Algeria	1995	14.0	25.0	1785	72	40	18	65	22	18	2.5	25
Algeria	2000	14.5	30.0	2069	73	30	20	70	25	20	3.0	30
Algeria	2005	15.0	35.0	2333	74	20	22	75	28	22	3.5	35
Algeria	2010	15.5	40.0	2580	75	15	25	80	30	25	4.0	40
Algeria	2015	16.0	45.0	2812	76	10	28	85	32	28	4.5	45
Algeria	2020	16.5	50.0	3030	77	8	30	90	35	30	5.0	50
Algeria	2025	17.0	55.0	3235	78	5	32	95	38	32	5.5	55
Algeria	2030	17.5	60.0	3428	79	3	35	100	40	35	6.0	60
Algeria	2035	18.0	65.0	3611	80	2	38	100	42	38	6.5	65
Algeria	2040	18.5	70.0	3783	81	1	40	100	45	40	7.0	70
Algeria	2045	19.0	75.0	3947	82	0.5	42	100	48	42	7.5	75
Algeria	2050	19.5	80.0	4098	83	0.2	45	100	50	45	8.0	80
Algeria	2055	20.0	85.0	4250	84	0.1	48	100	52	48	8.5	85
Algeria	2060	20.5	90.0	4390	85	0.05	50	100	55	50	9.0	90
Algeria	2065	21.0	95.0	4523	86	0.02	52	100	58	52	9.5	95
Algeria	2070	21.5	100.0	4651	87	0.01	55	100	60	55	10.0	100
Algeria	2075	22.0	105.0	4772	88	0.005	58	100	62	58	10.5	105
Algeria	2080	22.5	110.0	4888	89	0.002	60	100	65	60	11.0	110
Algeria	2085	23.0	115.0	5000	90	0.001	62	100	68	62	11.5	115
Algeria	2090	23.5	120.0	5106	91	0.0005	65	100	70	65	12.0	120
Algeria	2095	24.0	125.0	5208	92	0.0002	68	100	72	68	12.5	125
Algeria	2100	24.5	130.0	5306	93	0.0001	70	100	75	70	13.0	130
Algeria	2105	25.0	135.0	5400	94	0.00005	72	100	78	72	13.5	135
Algeria	2110	25.5	140.0	5490	95	0.00002	75	100	80	75	14.0	140
Algeria	2115	26.0	145.0	5576	96	0.00001	78	100	82	78	14.5	145
Algeria	2120	26.5	150.0	5660	97	0.000005	80	100	85	80	15.0	150
Algeria	2125	27.0	155.0	5740	98	0.000002	82	100	88	82	15.5	155
Algeria	2130	27.5	160.0	5818	99	0.000001	85	100	90	85	16.0	160
Algeria	2135	28.0	165.0	5892	100	0.0000005</						

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Closed-loop Continuous Operating Pyrolysis System for Processing Rubber Waste

Field of the Invention

5 The invention relates to a continuous operating system for processing the crushed rubber waste, by the aid of which - considering the quantity of the fed rubber waste - environment protecting liquid hydrocarbon of approximately 40-45 weight percent as well as coke of 30-45 weight percent can be produced as end product suitable for further processing. The closed-loop, controlled respectively adjusted system according to the invention ensures more economical recycle considering the known solutions and its importance is increased by the fact that the flue-gas leaving the system contains components only in slight quantity harmful to the environment much less than the admissible limit value.

10 Nowadays the important technical tasks stay in the center as for processing of the wastes accumulating in the environment as for exploring the recycling possibilities.

Numerous efforts are known for recycling the rubber wastes - such as the rubber tires amounting to its considering quantity - however, most of them proved uneconomical, respectively unsuitable for the mass production.

Prior Art

20 There are known such kind of solutions for example, which tend to the regeneration of the vulcanized grinds in order to be re-milled and re-calendered (recycling). The mutual disadvantage of the mentioned solutions is the considerable energy demand. As an example, the HU-PS 157,607 patent specification describes a solution, wherein the regeneration is performed only in the surface layers by means of double-stage heating process in the presence of oxygen by solution of double bonds.

25 A further part of the known solutions tends to produce the production from the mechanically crushed rubber waste, e. g. AT-PS 339,797 as well as AT-PS 355,291, and AT-PS 368,446 as well as CH-PS 601,567 patent specifications disclose the solutions for preparing floor-coverings, coverings for sporting ground; while from DD-PS 30 252,945 and HU-PS 206,383 patent specifications a process can be known for pro-



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5 ducing heat-insulating and noiseproof shaped figures. Furthermore, the use of the crushed rubber granule material at the road construction is also known, which is disclosed in DD-PS 121,744 patent specification. The advantage of these kind of solutions is in that the end product is made essentially from waste materials, and its disadvantage lays however in the fact that it does not represent considerable market demand.

10 In a further group of the utilization of the solutions, the rubber waste is used for recovering as fuel material. E. g. according to the DE-PS 2,131,519 the granules of the rubber waste are mixed with coal grains, then it will be molded and finally at the temperature of the 500-600 °C it will be briquetted. In the case of the solution described in CH-PS 615,215 the granules of the rubber waste are mixed with coal flours, and then it will be heat treated. According to the DE-PS 2,254,472 the rubber waste is also used for recovering as fuel material, wherein the crushed rubber tire is mixed with black oil. As a matter of course, these processes serve for the destruction (burning) of  
15 the rubber wastes.

Finally, the solutions have to be mentioned, wherein the aim is to reclaim the petroleum fractions, organic chemical raw materials used for the rubber production.

20 Such kind of process is disclosed by the Hungarian patent application No. 3374/84, the publication number of which is T/40.883, wherein the rubber waste is mixed with coal and/or charred coal, and after that in discontinuous operating carbonization chamber (advantageously metallurgy respectively in the appliances producing domestic gas) it will be carbonized. The advantage of the solution is in that the oil tar arising during the heat treatment burns on the particles of the coal or charred coal and increases their mass, while its disadvantage is the uneconomical discontinuous operation.  
25

From the US-PS 4,202,613 can be known an apparatus respectively a process, wherein during continuous operation partial oxidation and pyrolysis takes place. The GB-PS 1,437,224 discloses a process similarly for continuous operation, wherein the partial gasification of the rubber chips takes place at the rate of air lower than the stoichiometric air demand, and as a result of the procession burnable gas and charred coal  
30 is regenerated.

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Summary of the Invention

The aim of the invention is to realize a complex system (appliance) developing the known solutions, wherein restoring of the petroleum fractions can be realized more economically than in the known solutions.

5 On the basis of the above-mentioned aim the invention relates to a pyrolysis system, which partly by means of continuous operation, partly by means of the waste-heat recuperation and utilization as fuel material for the end product constitutes a regulated respectively controlled closed-loop system working in backward flow, which is of self-supplying and having optimal energy requirement.

10 The object of the invention is a closed-loop continuous operating pyrolysis system for processing rubber waste, comprising pyrolysis furnace provided with dosing tank, and flue-gas channel and external heating unit arranged at its one end to the pyrolysis furnace gas cooler(s) and separating unit(s) known in itself are joined by means of gas collector conduit, while to the other, opposite end of the dosing tank a solid-product  
15 sump is joined. The essence of the invention is in that the heat exchanger is arranged between the pyrolysis furnace and the solid-product sump through a gas conduit provided with a gas-meter and a gas-flow control valve and inserting a circulation ventilator and a suction control valve are joined to the outlet gas conduit of the separating unit(s), furthermore consists of a by-pass gas conduit provided with a gas-flow control  
20 valve arranged after the circulation ventilator, the by-pass gas conduit is joined to the heating apparatus and the cell cavity of the pyrolysis furnace provided with a temperature detector as well as pressure gauge and/or pressure transmitter, and the latter is connected to the controlling means of the suction control valve.

25 In a preferred embodiment of the closed-loop pyrolysis system according to the invention the pyrolysis furnace is a rotary-drum furnace, and its heating apparatus is an oil burner.

It is advantageous furthermore, if the liquid outlet of the separating unit is joined to the oil burner.

30 In a further preferred embodiment the solid-product sump is provided with a sampling unit.

In a preferred embodiment the gas-meter is a measuring orifice.

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In a simple embodiment according to the invention the gas coolers are of water-cooled condensers, while their separating units are of gravitational separating units, i.e. sumps having gas-channel outlet and liquid outlet.

5 In a given case, the separating unit(s) is a cyclone separator or vortex tube known in itself.

In a preferred embodiment according to the invention, due to safety reasons to the closed gas conduits an oxygen and hydrocarbon concentration meter is coupled.

#### Brief Description of the Drawings

10 The invention is described in detail with the aid of the enclosed drawing presenting the simple embodiment of the pyrolysis system respectively its operation according to the invention by way of example, in which: on

Figure 1 shows the block diagram of the pyrolysis system, indicating the fundamental controlling means.

#### Description of the Preferred Embodiments

15 In the case of the embodiment according to the Fig. 1 the pyrolysis furnace 1 of the pyrolysis system according to the invention is a drum-type furnace of adjustable position, which is provided with a heating apparatus 2 (gas or oil burner) for heating the outer cover and with a flue-gas outlet channel 19.

20 To the drum-type pyrolysis furnace 1, onto its one end a standing dosing tank 21 is joined. Therein are placed the rubber granules advantageously with the grain size of 1 to 5 mm, which is continuously fed into the reactor chamber of the pyrolysis furnace 1. (The mass flow of the rubber waste can be controlled.)

25 Onto the other end of the pyrolysis furnace 1 through the heat exchanger 3 is joined the solid-product sump 7. The gas collector conduit 15 joining to the reactor chamber of the pyrolysis furnace 1 serves for the drainage of the hot hydrocarbon gases released during the decomposition of the rubber during the pyrolysis, which (gas collector conduit 15) is well-known in itself and joins to the gas cooler 4, whereto the separating unit 5 is connected. In our example the gas cooler 4 consists of two series connected water-cooled 4a and 4b condensers, to the output of which one separating unit 5a and 5b (simple liquid collecting sump based on the gravity) are connected. The  
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gas space of the separating unit 5b is connected through the gas conduit 16, by inserting a control valve 8 controlling the exhaustion through a circulation ventilator 6 partly to the heat exchanger 3 partly to the heating apparatus 2 by means of a by-pass gas conduit 18. In the embodiment according to the invention - wherein the heating apparatus 2 of the pyrolysis furnace 1 comprises an oil burner - the liquid space of the separating unit 5a is also joined to the heating apparatus 2. To the gas conduit 17 joining to the heat exchanger 3 a gas-flow control valve as well as a gas-meter 11 (in our example measuring orifice) are joined and the by-pass gas conduit 18 is also provided with a gas-flow control valve 10. To ensure the adjustment (respectively controlling) into the reactor chamber of the pyrolysis furnace 1 a temperature detector 13 and a pressure gauge and/or pressure transmitter 12 are joined, the latter of which is in connection with the actuating unit of the control valve 8; while the solid-product sump 7 is provided with a sampling unit 20. Furthermore, in the Figure is represented the concentration meter 14 joining to the gas conduit 16 as well, by the aid of which the composition of recycle gas compound, especially its O<sub>2</sub>, H<sub>2</sub> and CH content (low explosibility limit) can be continuously controlled in order to avoid the explosion risk.

In the figure the connection of the units are represented by full line, the direction of the material flow is shown by arrow, while the connection of the detecting elements and actuating units for controlling respectively adjusting tasks is represented by dash line.

The operation respectively working principle of the pyrolysis system can be followed on the basis of the Figure. Bringing into service the closed system has to be filled with inert gas of air pressure, expediently with CO<sub>2</sub> gas or with inert gas of high CO<sub>2</sub> content, then by means of operating the circulation ventilator 6 the pressure is adjusted to the value of  $\Delta p = 0 - (-30)$  water column mm less than the atmospheric pressure. The mild suction ensures - as the air-consistency of the system cannot be ensured in the practice, respectively difficult to realize - that the pyrolysis product should not get to the environment, preventing the contamination of the environment respectively the material loss, and at the same time, the entering air respectively its O<sub>2</sub> content is negligibly small and does not disturb the process of the pyrolysis.

The circulation ventilator 6 continuously circulates the recirculated inert gas in counterflow with the fed rubber grinds, the quantity of which during the process increasingly extends and dresses (as a result of the pyrolysis process). The by-pass gas conduit 18 provided with gas-flow control valve 10 and joining to the heating apparatus 2

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serves for drainage of the spare gas quantity, respectively for utilization of its inflammable CH content.

The extent of the decomposition of the rubber waste, the quantitative proportions of the solid- and liquid products respectively their composition - naturally in the function of the fed initial reactant - depend fundamentally on the conditions of the pyrolysis taking place in the pyrolysis furnace 1, which is determined in addition to its temperature T, by the contact time of the rubber waste respectively its contact time with the counterflow gas (the time spent together). (Naturally it can be influenced by catalytic agent). Its coordinated adjustment (respectively controlling) is ensured by the detectors fitted into the system respectively by the controlling means, furthermore by the formation of the drum-type pyrolysis furnace 1.

The composition of the generated solid product is checked by the sampling unit 20 joining to the solid-product sump 7. The content of its volatile component is extremely characteristic to the extent of the decomposition. (Should the content of the volatile component is  $\leq 1\%$ , the decomposition of the carbon compound can be considered practically complete.) Depending on the result of the sampling there is a possibility for controlling the temperature of the pyrolysis furnace 1. By increasing the temperature the liquid-product yield increases, more exactly, the hydrocarbon content of the hot gas developing in the pyrolysis furnace 1, and there is a possibility to control the stay-together period, the latter can be influenced e.g. by the feeding rate of the rubber grinds as well as controlling the gas flow speed and the gas flow quantity. The latter is made possible by the gas-meter 11 inserted into the gas conduit 17 as well as by the gas flow control valves 9 and 10, by means of which the gas quantity being in the gas conduits 17 and 18 as well as the rate of the gas quantity can be adjusted, in the function of the measured value.

The dwell time of the solid material (rubber grids) in the pyrolysis furnace 1 takes about 10 to 120 minutes, the dwell time of the gas phase takes 1 to 10 sec depending on the required composition of the generated products.

From the pyrolysis furnace 1 through the gas collector conduit 15 the exiting gas is of 400 to 600 °C temperature, which will be cooled by means of conducting to the separating unit (in our example into the gas coolers 4a and 4b respectively into the separating units 5a and 5b) and the so condensed liquid product - in our example in two fractions - is separated from the gas. The composition and the quantity of the liquid

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product depend on the feedstock and essentially on the conditions of the pyrolysis. Its quantity considering the feedstock is of 40 to 55 weight percent, while considering its composition, it can be considered light fuel, which is of natural oil type, rich in olefins and suitable for direct utilization or further processing. The most essential feature of this liquid phase is in that - contrary to the natural oils - its sulfur content is very low, i.e. 0,6 to 0,8 percent. It is about the 1/3 of the sulfur content of the feedstock, while the further part of 2/3 accumulate in the solid product (coke), the gas phase of small quantity contains only slight sulfur compound, so the flue gas can be exited direct to the free.

10 The recooled gas (the mixture of the inert gas and the generated CH<sub>4</sub> gas) passing through the heat exchanger 3 contacts with the hot coke coming out of the pyrolysis furnace 1, and cooling it down considerably pre-heats itself. By this pre-heating the heating energy requirement of the system can be reduced by about 20-30 percent.

15 The comburent content of the gas mixture enriched by hydrocarbon amounts to about 5-15 percent, which passing through the gas conduit 18 into the heating apparatus 2 will be utilized. By means of burning of the hydrocarbon comprising in the redundant gas - depending on the condition of the pyrolysis - the 40 to 60 percent of the heat energy requirement can be ensured.

20 The further required heat energy is ensured by burning about the 10 to 25 percent of the liquid product separated in the separating unit.

Accordingly, the closed-loop continuously operating pyrolysis system according to the invention generates itself the energy required for its operation, meanwhile produces re-utilizable, environment protecting end-product from the cheap, waste basic components, and the resultant by-products neither load nor pollute the environment.

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## CLAIMS

1. Closed-loop continuous operating pyrolysis system for processing rubber waste, comprising pyrolysis furnace provided with dosing tank, flue-gas channel and external heating unit, furthermore, to the pyrolysis furnace gas cooler(s) and separating unit(s) as well as solid-product sump are joined by means of gas collector conduit, *characterized in* that the heat exchanger (3) arranged between the pyrolysis furnace (1) and the solid-product sump (7) through a gas conduit (17) provided with a gas-meter (11) and a gas-flow control valve (9) and inserting a circulation ventilator (6) and a suction control valve (8) are joined to the outlet gas conduit (16) of the separating unit(s) (5, 5a, 5b), furthermore consists of a by-pass gas conduit (18) provided with a gas-flow control valve (10) arranged after the circulation ventilator (6), the by-pass gas conduit (18) is joined to the heating apparatus (2) and the cell cavity of the pyrolysis furnace (1) provided with a temperature detector (13) as well as pressure gauge and/or pressure transmitter (12), and the latter is connected to the controlling means of the suction control valve (8).
2. Closed-loop continuous operating pyrolysis system according to the Claim 1, *characterized in* that its pyrolysis furnace (1) is a rotary-drum furnace, and its heating apparatus (2) is an oil burner.
3. Closed-loop continuous operating pyrolysis system according to the Claim 1 or 2, *characterized in* that the liquid outlet of the separating unit (5, 5a, 5b) is joined to the heating apparatus (2).
4. Closed-loop continuous operating pyrolysis system according to any of the Claims 1 or 3, *characterized in* that its solid-product sump (7) is provided with a sampling unit (20).
5. Closed-loop continuous operating pyrolysis system according to any of the Claims 1 or 4, *characterized in* that its gas-meter (11) is a measuring orifice.
6. Closed-loop continuous operating pyrolysis system according to any of the Claims 1 or 5, *characterized in* that its gas coolers (4, 4a, 4b) are of water-cooled condensers, while their separating units (5, 5a, 5b) are of gravitational separating units having gas-channel outlet and liquid outlet.

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7. Closed-loop continuous operating pyrolysis system according to any of the Claims 1 or 6, *characterized in* that to one of their gas conduits (16, 17, 18) a concentration meter is coupled.

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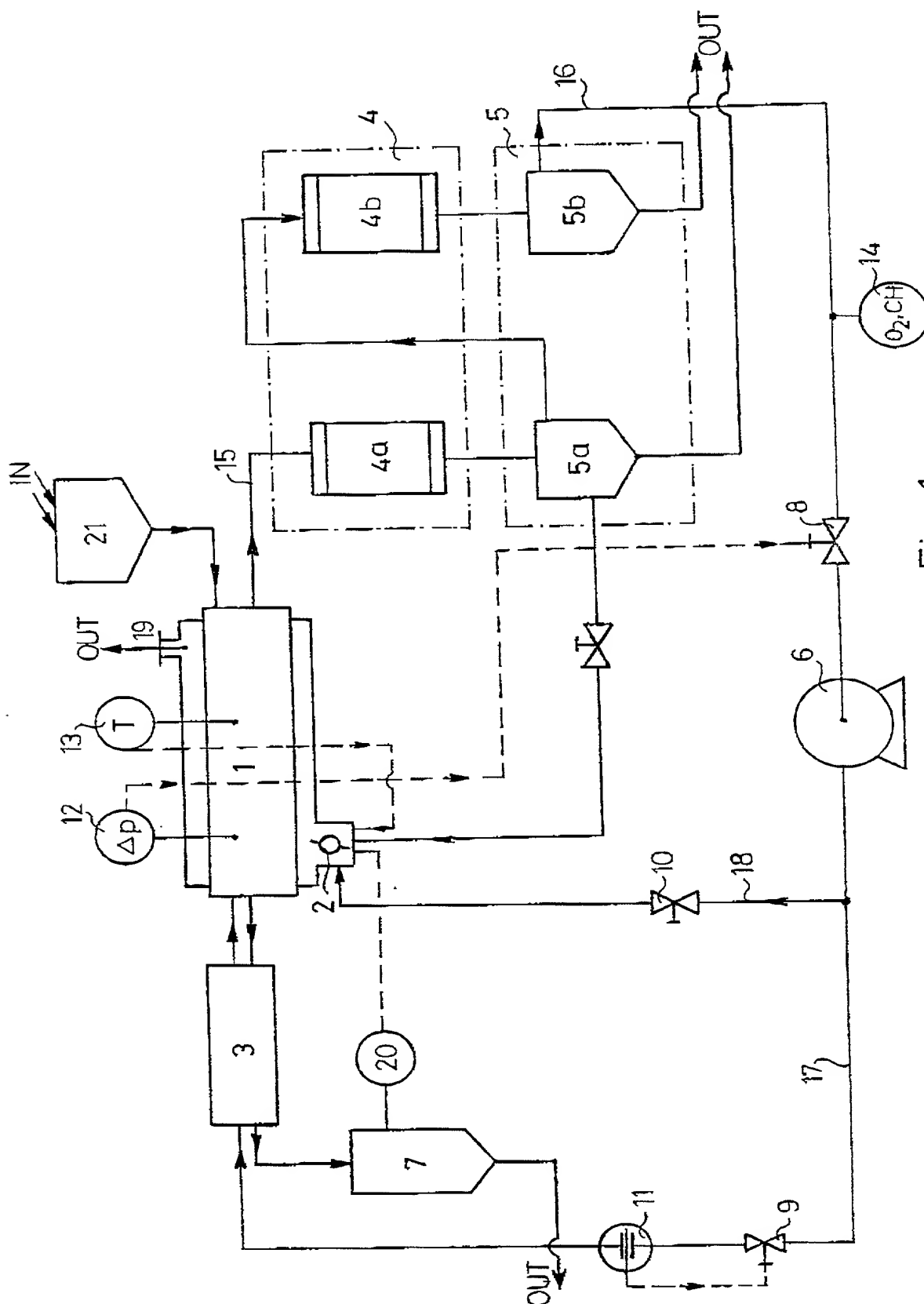


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DECLARATION FOR UNITED STATES PATENT APPLICATION,  
POWER OF ATTORNEY, DESIGNATION OF CORRESPONDENCE ADDRESS

Attorney Docket  
31443-159708

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled CLOSED-LOOP CONTINUOUS OPERATING PYROLYSIS SYSTEM FOR PROCESSING RUBBER WASTE the specification of which [ ] is attached hereto.

[ ] was filed on \_\_\_\_\_ as Application No. \_\_\_\_\_  
and was amended on \_\_\_\_\_ [if applicable].

[X] was filed under the Patent Cooperation Treaty on March 31, 1998,

Serial No. PCT/HU98/00034, the United States of America being designated.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent, utility model, design or inventor's certificate listed below and have also identified below any foreign application(s) for patent, utility model, design or inventor's certificate having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
Number	Country	Date Filed	Yes	No
U 97 00256	Hungary	October 6, 1997	X	

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: George H. Spencer (Reg. No. 18,038), Norman N. Kunitz (Reg. No. 20,586), Robert J. Frank (Reg. No. 19,112), Gabor J. Kelemen (Reg. No. 21,016), Robert Kinberg (Reg. No. 26,924), John W. Schneller (Reg. No. 26,031), Ashley J. Wells (Reg. No. 29,847), Allen Wood (Reg. No. 28,134), P.O. Box 34385, Washington, D.C. 20043-9998, Telephone: (202) 962-4800, Telefax: (202) 962-8300.

Address all correspondence to VENABLE, BAETIER, HOWARD & CIVILETTI, LLP, P.O. Box 34385, Washington, D.C. 20043-9998.

The undersigned hereby authorizes the U.S. attorneys named herein to accept and follow instructions from the undersigned's assignee, if any, and/or, if the undersigned is not a resident of the United States, the undersigned's domestic attorney, patent attorney or patent agent, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U.S. attorneys named herein will be so notified by the undersigned.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signature: X Peter Barsi Date: April 05, 2000.

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